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**DIVISION:** Nuclear Operations and Advanced Manufacturing

**DEPARTMENT:** Reactor Operations

**VACANCY:** **Junior Nuclear Analyst**

**SALARY BAND:** Hay Level 13/C2

**REFERENCE NO:** **NUCANALYST01**

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*NECSA is a State-Owned Company (SOC) in terms of the Companies Act and derives its mandate from the Nuclear Energy Act of 1999 responsible for undertaking and promoting research and development in the field of nuclear energy and radiation sciences and for the commercial exploitation of nuclear technology. NECSA engages in commercial business mainly through its two 100% owned commercial subsidiaries NTP Radioisotopes (Pty) Ltd. and Pelchem (Pty) Ltd. NTP is responsible for a range of radiation-based products and services for health care, life sciences and industry, whilst Pelchem supplies fluorine and fluorine-based products. Further information on NECSA can be obtained from the website [www.necsa.co.za](http://www.necsa.co.za)*

### **Job Profile:**

The primary purpose of the Nuclear Scientist/Engineer role is to perform engineering safety and design analyses to assess the safety and license-ability of the SAFARI-1 facility. This includes evaluating the facility in terms of design, operations, modifications, process changes, and the experimental, research, and utilization programs conducted at SAFARI-1.

### **Key Performance Areas:**

#### **Safety Analysis:**

- **Comprehensive Evaluations:** Perform detailed safety and design analyses to evaluate potential risks and the robustness of safety measures in place, ensuring the facility operates within the bounds of regulatory compliance and best practice standards.
- **Operational Safety Assurance:** Assess the operational safety protocols and emergency response plans to ensure they are effective and up to date, promoting a culture of safety throughout the facility.
- **Regulatory Compliance:** Ensure all safety analyses are documented and communicated to NNR as required, maintaining transparency and adherence to regulations.
- **Neutronics and Safety Analysis Utilization:**
- **MCNP/X and FISPACT-II Application:** Expertly apply MCNP/X (Monte Carlo N-Particle Transport Code) and FISPACT-II (inventory and source term code) for precision in

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- neutronics and radiological safety analysis, following stringent international guidelines and meeting regulatory compliance.
- **Analysis Optimization:** Optimize the use of these codes to simulate reactor behavior accurately under various conditions, enhancing the understanding of core dynamics and radiation transport.
  - **Regulatory Adherence:** Stay up to date with international guidelines and changes in regulatory requirements to ensure all analyses remain compliant and relevant.
  - **Code Development and Maintenance:**
    - **In-House Code Enhancement:** Contribute to the development and refinement of proprietary fuel and core management codes, improving their functionality and ensuring they meet the specific needs of the facility.
    - **Accuracy and Reliability:** Validate and verify the codes regularly to ensure they produce accurate and reliable data for effective core management and operational decision-making.
    - **Continuous Update:** Maintain and update the codes to incorporate the latest research findings, feedback from operational experience, and evolving technological advancements.
  - **Reactor Operations Nuclear Safety Committee Support:**
    - **Committee Engagement:** Actively support the SAFARI-1 Reactor Operations Nuclear Safety Committee by assisting with administration, providing technical expertise, contributing to safety reviews, and advising on safety-related matters.
    - **Safety Enhancements:** Collaborate with the RSC to identify areas for safety improvements, recommend changes, and help implement new safety protocols.
    - **Documentation and Reporting:** Assist in preparing comprehensive reports for the RSC, documenting safety assessments, incident analyses, and recommendations for maintaining and enhancing reactor safety.
  - **Beryllium Management:**
    - **Procedure Implementation:** Execute the implementation of the beryllium management procedure, establishing protocols for safe handling, storage, and disposal of beryllium to prevent exposure and contamination.
    - **Safety Protocols Enforcement:** Enforce stringent safety protocols and provide training to staff on the proper handling of beryllium assemblies.

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- Disposal Compliance: Oversee the disposal process of beryllium assemblies, ensuring it complies with environmental regulations and industry best practices for hazardous waste management
- **Core Reload Predictions:**
- Calculations and Modelling: Utilize advanced computational models to perform accurate core reload predictions, including critical parameters like fuel cladding temperature, to facilitate safe and efficient reactor operations.
- Operational Safety Analysis: Analyze the implications of core reload scenarios on reactor safety, thermal limits, and fuel integrity to ensure all operations remain within the safe operational envelope.
- Predictive Accuracy: Continuously improve the predictive models based on operational data and feedback to enhance the accuracy of future core reload predictions
- **Core Management Processes:**
- Process Verification: Regularly verify core management processes to ensure their accuracy and reliability, incorporating checks and balances to prevent and detect errors.
- Procedure Optimization: Work on optimizing core management procedures, streamlining operations while maintaining high safety standards and regulatory compliance.
- Continuous Monitoring: Implement continuous monitoring and assessment of core performance to provide real-time data that supports effective core management and decision-making processes.
- **Safeguards Compliance Documentation:**
- Comprehensive Documentation: Produce comprehensive, accurate, and up-to-date documentation required for nuclear safeguards compliance. This includes inventory lists, material transfer records, and facility operation details, ensuring readiness for inspections.
- Preparation for Inspections: Regularly update and review compliance documentation to ensure readiness for unannounced inspections by international bodies, such as the IAEA.
- Data Integrity: Ensure that all data provided in the documentation is accurate and verifiable, maintaining a high level of integrity and transparency in all records.
- **Safeguards Ledgers and Reports:**

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- **Accurate Bookkeeping:** Keep meticulous records of nuclear materials, including their use, storage, and transfer, in line with QA (Quality Assurance) standards and safeguard procedures.
- **Inventory Management:** Generate and maintain inventories that accurately reflect the current status of nuclear materials within the facility, ensuring that all changes are logged in a timely and precise manner.
- **Report Generation:** Prepare and submit required ledgers and reports that detail the facility's adherence to safeguard procedures, facilitating oversight by regulatory agencies and internal stakeholders.
- **IAEA Inspections Representation:**
  - **Inspection Liaison:** Assist with liaison between SAFARI and the IAEA during inspections and audits, supporting the engagement and ensuring that all interactions are conducted professionally and constructively.
  - **Compliance Assurance:** Demonstrate the facility's compliance with international safeguards and nuclear non-proliferation treaties during inspections, addressing any queries and facilitating the inspectors' access to required areas and information.
  - **Follow-Up Actions:** After inspections, assist with any necessary follow-up actions to address recommendations or findings, and incorporate feedback into the facility's safeguards practices to maintain and improve compliance standards.
- **Reactor Utilization Activities Support:**
  - **Operational Support:** Provide technical and operational support for the reactor's utilization activities, ensuring optimal scheduling and resource allocation for activities like Mo-99 production, ad hoc isotope production, and silicon doping.
  - **Production Planning:** Assist in the planning and execution of production cycles, addressing logistical, technical, and safety considerations to meet both commercial and research demands.
  - **Process Optimization:** Work towards continuous improvement of the reactor utilization processes to enhance efficiency and output while adhering to safety standards.
- **Coordination with R&D Teams:**

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- Collaborative Planning: Engage with R&D teams to plan and execute experimental programs that leverage the reactor's capabilities, facilitating innovative research and development initiatives.
- Communication and Feedback: Maintain clear communication channels with R&D teams to gather feedback and coordinate with reactor operations to support research activities effectively.
- Safety Training: Engage in regular safety trainings and contribute to the training of staff.
- BBS Observations: Perform monthly safety observations to identify and encourage safe workplace behaviors.
- Safety Initiatives: Actively participate in and promote safety culture through continuous improvement efforts and open communication on safety matters.

### **JOB REQUIREMENTS**

#### **KEY KNOWLEDGE & SKILLS**

- Scientific computer skills
- Reactor/Nuclear Engineering
- Safety Assessment and licensing
- Knowledge and application of quality systems
- In-depth technical knowledge of the reactor and associated issues

#### **COMPETENCIES**

- Analytical thinking and attention to detail
- Anticipating and managing change
- Focus and alertness
- Holistic / big picture thinking
- Creativity / innovation
- Judgement and decision-making
- Problem solving
- Memory
- Tolerance of ambiguity
- Action orientation and decisiveness
- Adaptability / flexibility
- Excellence / quality orientation
- Rule orientation
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### Qualifications and Experience:

#### Education:

- BSc (Hons) Physics or B.Eng Nuclear Engineering.

#### Experience:

- 1-4 years in reactor engineering, reactor safety analysis, reactor utilization and isotope production.

Closing date: **November 2025.**

### CONTACT PERSON

Ms. Ofhani Tshila

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**Important:** Necsa Group is committed to Employment Equity when recruiting. Therefore, priority will be given to African Females, African Males, and people with disabilities, in support of achieving our Employment Equity targets.

### GENERAL:

*Should you not hear from us within 30 days of the closing date, please consider your application unsuccessful.*